

## ELECTRICITY APPLIED TO THE ARTS.

At the time when Volta made his discovery of the effect of two different metals combined at one end, and the other of one placed on the muscles, and the end of the other on the nerves of a recently-killed frog—it was probably not entertained by him for a moment that, when he saw the muscular contraction of the animal, his discovery would lead to such important results in the arts and manufactures, although he might have imagined that, at some future time, its physiological effects might be productive of much benefit to mankind; which has since been the case. To explain the theory of voltaic electricity is all that is required in this instance, as it is only intended to speak here of electricity as applied to electrotyping. The theory that Volta first laid down was, that electricity was excited by the mere contact of two different metals—for instance, when a plate of copper and a plate of zinc are made to touch by the surface, the zinc exhibits positive electricity after separation, and the copper negative; and by a series of experiments of this kind, he found that similar phenomena took place, from which he was induced to arrange the metals in the following order of their respective qualities, it being understood, that the first gives up its electrical qualities to the second, the second to the third, and so on—silver, copper, iron, tin, lead, zinc—or in other words, the first is negative to the second, the second to the third, &c. This theory is somewhat at variance with other phenomena of more recent observation, which has proved beyond a doubt that oxidation is the cause of the phenomena, seeing that the chemical agency of the liquids on the most oxidisable metals of the various arrangements is essential to their activity being sustained; and on this theory the batteries that are used for the electrotype and all kinds of galvanic purposes are made, viz.—two metals, conductors, and a chemical solution, also a conductor, but not so perfect as the metals. Long before the idea of depositing metals by electricity was brought before the public, it was well known to all who had used the sustaining battery of Professor Daniel, the form of which is a cylindrical piece of zinc, surrounded by a bladder or any other porous diaphragm, into which diluted sulphuric acid is placed; outside the zinc a cylinder of copper, which is immersed in a solution of sulphate of copper; that during the action the sulphate was decomposed, and the copper contained deposited on the negative (copper) plate. But it remained for Mr. Spencer, in 1839, to apply it to the useful purpose of multiplying copper-plates, engravings, &c., and has since, by various improvements by various persons, become a science in itself of great importance. The trifling obstacles that present themselves on first practising the copying of plates, &c., appear at the onset to be very formidable, but on care and observation being exercised, they will vanish, and the various processes employed will then be comparatively easy, so that these causes ought not to stop the progress of the manipulator, the processes being exceedingly simple, and performed as follows:—The object being in all cases to complete the current, so that there may be a continued current of electricity flowing uninterruptedly from pole to pole; so that in all non-conducting substances we have to cover the parts to be copied with a metallic surface, to allow the current a passage, that the metal may be deposited by the passing electricity; and in all absorbent substances, we are compelled, to prevent them being destroyed or otherwise damaged, to coat them over with a varnish, or any other material that will render them non-absorbent, and afterwards proceed, as in non-conducting substances, in taking a metal impression from a plaster cast; we have to let it absorb as much oil as it will, and then dry it in, or varnish with a coat or two of any varnish that will become hard; afterwards it is brushed over the parts to be copied with blacklead, until a uniform surface is obtained, which of course requires a little care, as, where the surface is not thoroughly covered, there the deposition will not take place. The usual method adopted is to take a mould from the plaster in white wax, or equal parts of resin and bees'-wax will answer the same purpose; it is performed as follows:—Fasten by a string, or any other means, a piece of card-board round the cast,

so that it may project about half an inch or an inch above the surface of the cast; according to the depth, the figure will be on the mould; place the bottom of the cast in hot water until the surface appears to shine by the absorption of the water; then pour on the wax, which must not be very hot; only there is caution required to pour it on gently, or there will be bubbles of air that will prevent it from being perfect; it is then to be blacklead, with a camel's-hair brush, in the manner before described, and it is ready to be suspended: a little spirits of wine may be used with the lead in preparing seals—the surfaces can be done the same. In placing medals, &c. in action, care should be taken that they are chemically clean; they should be washed well with an alkali, as potash or soda, to remove the grease (as the perspiration from the fingers will prevent the action going on), and afterwards in distilled water; these being metal, require their surfaces to be perfectly freed from oxide. The manner of proceeding after having got the objects ready for immersion, is simply to fasten to them a piece of copper wire, at any convenient place, by means of wax or any kind of cement, taking care that the wire is in contact with the object to be copied, and then, according to the apparatus employed, the arrangements must be made; the single cell by which the sulphate of copper is decomposed, and the battery arrangement by means of which sheet-copper is decomposed and precipitated, the single cell being a porcelain jar nearly filled with sulphate of copper in solution, a few crystals being suspended to keep up the solution to the point of saturation, a small tube, made of clay, unglazed, as so as to be porous, and allow the current of electricity to pass through, is filled with diluted sulphuric acid, and a piece of zinc, with a screw attached at the top, is placed in it; the object to be copied is then fastened to the screw, and suspended in the solution of copper; the action then takes place, and in a short time will be covered with metallic copper by the battery process. A decomposing trough must be used if a Smee's battery is used, which is made of platinized silver and zinc amalgamated, in which sulphuric acid only is used, diluted with about eight times its quantity of water; the trough is filled with a solution of sulphate of copper, the object to be copied is then fastened to the positive pole of the battery, and the negative pole to a sheet of copper; they are both then suspended in the solution, and the action goes on according to the intensity of the action of the battery, which requires some regulation, as when the action is too intense, hydrogen being evolved with rapidity at the negative plate, the metal is thrown down too brittle, and in a state of crystallization; when too feeble, and no hydrogen being given off at the negative plate, it is then deposited in a black powder. The best point is when hydrogen is just at the point of evolution at the negative plate. The manner of proceeding when using a Daniel's battery, as regards the connection, is the same. The facilities this affords to take copies of the various ornaments that are used in the various departments of building are obvious, and must, on reflection, show the advantages likely to be derived from such a source, the processes being simple, the expense comparatively trifling. It would take up more space than could be conveniently spared in such a work as this, to enter into every detail respecting the science of electrography, as, since the time it was first introduced, there have been so many different forms of apparatus used, and so many persons engaged in its application, that volumes might be written and the subject still unexhausted; but the different ways enumerated above are those which have received the most attention, and appear to be the most perfect methods yet known of precipitating metals by electricity, from the fact of their being almost universally adopted where the art is practised.

H.

BROMPTON CHURCH OF THE HOLY TRINITY, built about fourteen or fifteen years since, the windows, &c. of which were then finished according to the meagre style of the Church Commissioners, is now being renovated by public subscription, by having beautiful new windows, &c. put in place of the original ones. This is one of the most beautifully situated of the new churches near London.

## SURVEY OF THE METROPOLIS.

We return to this subject again this week, because we think that no time should be lost in pressing the matter on the attention of government for the just benefit of all parties. It will be no excuse for us to say that we found the surveyors themselves indifferent or apathetic on the subject. It is our duty to arouse them to a sense of their own interests if necessary. A public journal is a public tongue and a public monitor, may, we may rather say, a public conscience, and performs its functions best when it performs them conscientiously. Now the man of conscientiousness is not disposed to throw blame upon others when a large share is fairly attributable to himself—he endeavours to set the account right on his own side, and then, and not till then, has he secured a clear privilege of taking objections to the conduct of others. So in this matter as regards the surveyors of the metropolis—let them do all that is necessary on their own parts, and do it in a proper spirit, and they may depend upon it they will not have much after that to reproach the government with.

We are the more intent upon pressing this matter forward because we find from a paragraph in the daily papers, that the survey of Windsor has just been entered upon at the instigation of government by the ordinance department—there may be many reasons why this step may be regarded as a proper one, and we are not prepared upon the slight evidence before us to enter into any question of the proceeding—we cannot condemn or disapprove, without knowing all the circumstances upon which our judgment should be based; but we are apprehensive that something too much of this principle may be pursued in the matter of the London survey, and we say again that we shall hardly be prepared to blame the government if, in the supineness and apathy of the surveying profession, they should come to any such conclusion. But it will be seen that to do so, that is, for the government to enter upon any such course of procedure, would be to violate some of the first principles of right dealing, which this business-like nation has thriven and acted upon. We can only compare the case to that which the government might adopt with the medical or legal staff attached to the executive, by undertaking in the former case to supply medicine and medical advice to the metropolitan parishes, or in the latter, to draw up wills, deeds, and execute conveyances, &c., under a commission. If we are to have a metropolitan surveying government board, let us have one for medicine and for law; nay, let the principle be carried out in full, to test its absurdity and injustice; let us centralize all, and have government stores and merchandize, even down to the baker, the butcher, and the brewer—and what not these as well as government surveyors?

It is most likely that we are assuming a hypothesis, having no foundation in reality—we are willing to suppose that such may be the case; but granting for a moment that it may be otherwise, we ask the surveyors of London whether it becomes them to be inactive; let them not be clamorous and discontented after the evil is done—their own silent acquiescence in it will be the fitting answer to their upbraidings.

Many, many thousand pounds must necessarily be expended in this important work; the public ought to be greatly interested in it, and, not least, in the proper and beneficial distribution of its cost. What so proper and so beneficial as amongst their respectable neighbours, and that the whole control and management should be in those experienced in the properties of their respective districts? Great advantages too will flow of a good system on the basis that we are advocating to the profession, in bringing the leading minds to devise a sound and comprehensive scheme of procedure, and accustoming all to the carrying it out. Rightly managed, this incident may be made to lead more to the perfecting our skill and knowledge in the business of surveying than any thing that could be devised of a more professedly direct tendency. It would be a schooling for the profession which centuries of ordinary practice would fall short of. There are, therefore, many most weighty reasons for an Englishman's activity and energy in this business; and that it be exercised at the right time, the blow must be struck promptly.